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Coupling BBL and QuikSCAT Winds in the Generalized Terrain-Following
Coordinate System

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ABSTRACT

A hybrid Z-, Isopycnal, Sigma-coordinate features with bottom boundary layer (BBL) and NASA's near-real-time QuikSCAT winds are incorporated into the generalized terrain-following coordinate system. The method is based on the combined techniques of the generalized vertical coordinate system Kasahara (1974), the general pressure gradient formulation of Song (1998), and the embedded BBL scheme of Song and Chao (2000). The objective of the study is to develop a general vertical coordinate capability for numerical ocean models to better represent the subgridscale mixing and bottom boundary layer processes. The developed techniques will be first applied to the ONR-initiated Expert Modeling System for future ocean nowcast/forecast applications. A suite of process-oriented test problems will be used to evaluate the accuracy and efficiency of the new scheme. A science application with the coupled eddy-sediment transport in a coastal ocean model will be presented. It is shown that the new method generates much better results than that without the BBL and is capable of handling both shallow- and deep-ocean processes under severe weather conditions.